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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference SHW:LM:FP20723	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/AU2004/001581	International filing date (day/month/year) 16 November 2004	Priority date (day/month/year) 18 November 2003	
International Patent Classification (IPC) or national classification and IPC Int. Cl. 7 E04F 21/165, E04B 1/61			
Applicant AUSTRALIAN CONSTRUCTION TECHNOLOGY PTY LTD et al			

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
a. <input checked="" type="checkbox"/> (sent to the applicant and to the International Bureau) a total of 11 sheets, as follows:
<input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
<input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4. This report contains indications relating to the following items:
<input checked="" type="checkbox"/> Box No. I Basis of the report
<input type="checkbox"/> Box No. II Priority
<input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/> Box No. IV Lack of unity of invention
<input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/> Box No. VI Certain documents cited
<input type="checkbox"/> Box No. VII Certain defects in the international application
<input type="checkbox"/> Box No. VIII Certain observations on the international application

Date of submission of the demand 3 May 2005	Date of completion of the report 28 October 2005
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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/AU2004/001581

## Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

This report is based on translations from the original language into the following language which is the language of a translation furnished for the purposes of:

- international search (under Rules 12.3 and 23.1 (b))
- publication of the international application (under Rule 12.4)
- international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

the international application as originally filed/furnished  
 the description:

pages 1-6 as originally filed/furnished  
 pages\* 7-16 received by this Authority on 3 May 2005 with the letter of 3 May 2005  
 pages\* received by this Authority on with the letter of

the claims:

pages as originally filed/furnished  
 pages\* as amended (together with any statement) under Article 19  
 pages\* 17-21 received by this Authority on 3 May 2005 with the letter of 3 May 2005  
 pages\* received by this Authority on with the letter of

the drawings:

pages 1/13-13/13 as originally filed/furnished  
 pages\* received by this Authority on with the letter of  
 pages\* received by this Authority on with the letter of

a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3.  The amendments have resulted in the cancellation of:

- the description, pages
- the claims, Nos. 25-27
- the drawings, sheets/figs
- the sequence listing (*specify*):
- any table(s) related to the sequence listing (*specify*):

4.  This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- the description, pages
- the claims, Nos.
- the drawings, sheets/figs
- the sequence listing (*specify*):
- any table(s) related to the sequence listing (*specify*):

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/AU2004/001581

**Box No. V** Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims 1-24	YES
	Claims -	NO
Inventive step (IS)	Claims 1-24	YES
	Claims -	NO
Industrial applicability (IA)	Claims 1-24	YES
	Claims -	NO

## 2. Citations and explanations (Rule 70.7)

The invention of the claims is a butt joint connector for forming butt joints between two building sheets, the connector including a first and second plurality of attachment members for attachment to a first and second adjacent sheets, the connector extending transversely to the sheet edges and providing connecting surfaces to engage the sheets surfaces, where the first and second plurality of attachment members surfaces are inclined to each other to define a concavity so that when the first and second sheets are connected to the attachment members the sheets adjacent the butt joint edge are pulled towards the attachment members surfaces so as to form a recess which can be filled with a filler. Further there are connecting elements connecting the first and second plurality of attachment members together in spaced apart relationship.

The citations do not disclose such a butt joint connector.

The closest art is AU 199226311 where there is no plurality of attachment members nor are they connected in a spaced apart relationship.

BUTT JOINT CONNECTOR

Field of the Invention

5 This invention relates to a butt joint connector for forming a butt joint between two building sheets such as plasterboard, a method of forming the butt joint and a building structure using the connector.

Background of the Invention

10 Plasterboard is used to form ceilings and walls in buildings and, in particular, domestic premises. The plasterboard is provided with a pair of longitudinal edges which are each provided with a recess so that when two such boards are arranged side by side, the recess of one 15 board and the recess of the other board enable the joint between the two boards to be finished. This usually takes place by locating a mesh tape along the recesses and over the longitudinal edges of the boards and applying a base coat to the recesses.

20 The plasterboard has smaller end edges. These edges are often cut so that the plasterboard is of a particular length and it is often necessary to butt join the smaller edge (the butt joint edge) of one plasterboard to the 25 smaller edge (the butt joint edge) of another plasterboard to thereby form a butt joint.

30 There are several conventional techniques for forming a butt joint, all of which suffer from a number of drawbacks including the time taken to complete the joint, the finish which is obtained and the integrity of the joint to resist cracking.

Summary of the Invention

35 The present invention provides a butt joint connector for forming a butt joint between two building sheets, each respectively having a butt joint edge, comprising:  
a first plurality of attachment members for

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attachment to one of the sheets;

a second plurality of attachment members for attachment to the other of the sheets so that the first and second attachment members extend transverse to the edges of the sheets and provide connection surface to engage the sheets when the connector is attached to the sheets;

connecting elements for connecting the first and second plurality of attachment members together in spaced apart relationship; and

wherein the first and second plurality of attachment members define a concavity so that when the first and second sheets are connected to the attachment members, the sheets adjacent the edges are pulled towards the attachment members so as to define a recess adjacent the edges so that the recess can be finished with a filler to fill the recess and form the butt joint.

Preferably the concavity is an inverted V-shape.

In one embodiment the first and second attachment members comprise a plurality of transverse ribs, each rib having a first arm which forms a respective first attachment member and a second arm which forms a respective second attachment member, the first and second arms having surfaces which are inclined with respect to one another to form the inverted V-shape.

Preferably the first and second arms of each rib are arranged in the same plane.

Preferably the surfaces of the first arm are in a common first plane and the surfaces of the second arm are in a second common plane inclined with respect to the first plane.

In one embodiment the connecting elements comprise a plurality of longitudinal frame members for connecting the

ribs.

5 In one embodiment a locator element is provided between the first and second arms at the apex of the inverted V-shape formed by the first and second arms for locating the edges of the sheets.

10 In another embodiment the connecting elements comprise a plurality of webs between adjacent ribs, each web having a first end and a second end connected to a respective one of the adjacent ribs, a hinge at the first and second ends for connecting the web to the respective rib, and an intermediate hinge between the first and second ends of each web, so that the connector is moveable between a 15 collapsed position in which the web is folded and the adjacent ribs are side by side and an expanded position in which the ribs take up the spaced apart relationship by expansion of the webs about the hinges.

20 In this embodiment each of the ribs preferably comprises a base which defines the inverted V-shape, a pair of side walls extending upwardly from the base and at least one gusset interconnecting the base and the side walls.

25 Preferably the hinges are integral hinges. The hinges may be formed in the webs by a score line or the like.

30 Preferably the connector includes locking elements for locking the connector in the expanded position.

Preferably the locking elements are formed on the webs.

35 Preferably the webs comprise a first arm connected to one of the ribs by the hinge at the first end, and a second arm connected to an adjacent rib by a hinge at the second end, the first and second arms being connected together by the intermediate hinge, the first arm having a free end and the second arm being connected to the first arm at the

intermediate hinge inwardly of the free end, the free end having a first connector element and the second arm having a second connector element so that when the connector is expanded, the first and second elements engage to lock the 5 web in the expanded position.

Preferably the web includes a strut connected to one of the ribs at one end and to an adjacent rib by a frangible bridge at the other end to thereby space the ribs apart 10 during moulding and in transportation and to hold the ribs in the retracted position, the frangible bridge being broken when the connector is moved to the expanded position and the first arm having a third connector for 15 engaging the strut to facilitate holding of the web in the expanded position.

Preferably the first and second connectors comprise engagable hooks.

20 The invention also provides a method of forming a butt joint between two sheets of building material having respective edges, the method comprising:

securing a connector as described above to one of the sheets so the connector extends beyond the edge of 25 that sheet and so the region of the sheet adjacent the edge is pulled towards the first attachment members of the connector;

connecting the sheet to a first framework member;  
attaching the other sheet to the second 30 attachment members of the connector so that the edges of the first and second sheet are adjacent one another and the second sheet is also pulled towards the second attachment member so that the sheets adjacent the edges form a recess; and

35 connecting the second sheet to a second building framework.

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Preferably the method further comprises finishing the joint by applying a filler to fill the recess.

5 Preferably the first sheet is connected to the connector prior to connecting the first sheet to the first frame member. However in other embodiments the first sheet may be connected to the first frame member and then subsequently the connector connected to the first sheet.

10 Preferably the second sheet is connected to the second frame member before the second sheet is attached to the connector.

15 Preferably the step of fixing the first and second sheets to the connector comprises screwing the sheets to the connector member.

The invention also provides a building structure comprising:

20 a first sheet connected to a first frame member;  
a second sheet connected to a second frame member, the first and second sheets having edges which are arranged adjacent one another;

25 connected to the first and second sheets between the first and second frame members and spanning the edges of the sheets, the first and second sheets being connected to the connector so that the first and second sheets adjacent the edges are pulled towards the connector to form a recess;  
30 and

a filler material applied to the recess to finish the butt joint between the first and second sheets.

35 Preferably the sheets are connected to the connector by screws.

In one embodiment the structure is part of a ceiling. However, in other embodiments, the structure may be a

vertical wall.

5 The invention also provides a butt joint connector for forming a butt joint between two building sheets, each respectively having a butt joint edge, comprising:

a first plurality of attachment members for attachment to one of the sheets;

10 a second plurality of attachment members for attachment to the other of the sheets so that the connector spans the edges of the respective sheets when the connector is attached to the sheets;

15 connecting elements for connecting first attachment members together and for connecting second attachment members together, so that the first and second attachment members can move, from a collapsed position in which the first attachment members are in side-by-side relationship and the second attachment members are in side-by-side relationship, to an expanded position in which the first attachment members are spaced apart from one another and the second attachment members are spaced apart from one another; and

20 25 wherein the first and second plurality of attachment members define a concavity so that when the first and second sheets are connected to the attachment members, the sheets adjacent the edges are pulled towards the attachment members so as to define a recess adjacent the edges so that the recess can be finished with a filler to fill the recess and form the butt joint.

30 **Brief Description of the Drawings**

Preferred embodiments of the invention will be described, by way of example, with reference to the accompanying drawings in which:

35 Figure 1 is a plan view of a ceiling using a butt joint connector in accordance with one embodiment of the invention;

Claims

1. (amended) A butt joint connector for forming a butt joint  
5 between two building sheets, each respectively having a  
butt joint edge, comprising:

a first plurality of attachment members for  
attachment to one of the sheets;

10 a second plurality of attachment members for  
attachment to the other of the sheets so that the first  
and second attachment members extend transverse to the  
edges of the sheets and provide connection surface to  
engage the sheets when the connector is attached to the  
sheets;

15 connecting elements for connecting the first and  
second plurality of attachment members together in spaced  
apart relationship; and

20 wherein the first and second plurality of  
attachment members define a concavity so that when the  
first and second sheets are connected to the attachment  
members, the sheets adjacent the edges are pulled towards  
the attachment members so as to define a recess adjacent  
the edges so that the recess can be finished with a filler  
to fill the recess and form the butt joint.

25

2. The connector of claim 2 wherein the concavity is  
an inverted V-shape.

30 3. The connector of claim 1 wherein the first and  
second attachment members comprise a plurality of  
transverse ribs, each rib having a first arm which forms a  
respective first attachment member and a second arm which  
forms a respective second attachment member, the first and  
second arms being inclined with respect to one another to  
35 form the inverted V-shape.

4. The connector of claim 3 wherein the first and  
second arms of each rib are arranged in the same plane.

5. The connector of claim 3 wherein the surfaces of the first arm are in a common first plane and the surfaces of the second arm are in a second common plane inclined 5 with respect to the first plane.

6. The connector of claim 1 wherein the connecting elements comprise a plurality of longitudinal frame members for connecting the ribs.

10 7. The connector of claim 1 wherein a locator element is provided between the first and second arms at the apex of the inverted V-shape formed by the first and second arms for locating the edges of the sheets.

15 8. The connector of claim 1 wherein the connecting elements comprise a plurality of webs between adjacent ribs, each web having a first end and a second end connected to a respective one of the adjacent ribs, a hinge at the first and second ends for connecting the web to the respective rib, and an intermediate hinge between the first and second ends of each web, so that the connector is moveable between a collapsed position in 20 which the web is folded and the adjacent ribs are side by side and an expanded position in which the ribs take up the spaced apart relationship by expansion of the webs 25 about the hinges.

9. The connector of claim 8 wherein the ribs 30 comprise a base which defines the inverted V-shape, a pair of side walls extending upwardly from the base and at least one gusset interconnecting the base and the side walls.

35 10. The connector of claim 8 wherein the hinges are integral hinges.

11. The connector of claim 8 wherein the connector includes locking elements for locking the connector in the expanded position.

5 12. The connector of claim 11 wherein the locking elements are formed on the webs.

13. The connector of claim 12 wherein the webs comprise a first arm connected to one of the ribs by the hinge at the first end, and a second arm connected to an adjacent rib by a hinge at the second end, the first and second arms being connected together by the intermediate hinge, the first arm having a free end and the second arm being connected to the first arm at the intermediate hinge inwardly of the free end, the free end having a first connector element and the second arm having a second connector element so that when the connector is expanded, the first and second elements engage to lock the web in the expanded position.

20

14. The connector according to claim 13 wherein the web includes a strut connected to one of the ribs at one end and to an adjacent rib by a frangible bridge at the other end to thereby space the ribs apart during moulding and in transportation and to hold the ribs in the retracted position, the frangible bridge being broken when the connector is moved to the expanded position and the first arm having a third connector for engaging the strut to facilitate holding of the web in the expanded position.

30

15. The connector according to claim 13 or 14 wherein the first and second connectors comprise engagable hooks.

16. A method of forming a butt joint between two sheets of building material having respective edges, the method comprising:

securing a connector, as defined in any one of claims 1 to 15, to one of the sheets so the connector

extends beyond the edge of that sheet and so the region of the sheet adjacent the edge is pulled towards the first attachment members of the connector;

5 connecting the sheet to a first framework member;  
attaching the other sheet to the second  
attachment members of the connector so that the edges of  
the first and second sheet are adjacent one another and  
the second sheet is also pulled towards the second  
attachment member so that the sheets adjacent the edges  
10 form a recess; and  
connecting the second sheet to a second building  
framework.

17. The method of claim 16 wherein the method further  
15 comprises finishing the joint by applying a filler to fill  
the recess.

18. The method of claim 16 wherein the first sheet is  
connected to the connector prior to connecting the first  
20 sheet to the first frame member.

19. The method of claim 16 wherein the second sheet  
is connected to the second frame member before the second  
sheet is attached to the connector.

25 20. The method of claim 16 wherein the step of fixing  
the first and second sheets to the connector comprises  
screwing the sheets to the connector member.

30 21. A building structure comprising:  
a first sheet connected to a first frame member;  
a second sheet connected to a second frame  
member, the first and second sheets having edges which are  
arranged adjacent one another;  
35 a butt joint connector as defined in any one of  
claims 1 to 15 connected to the first and second sheets  
between the first and second frame members and spanning  
the edges of the sheets, the first and second sheets being

connected to the connector so that the first and second sheets adjacent the edges are pulled towards the connector to form a recess; and

5 a filler material applied to the recess to finish the butt joint between the first and second sheets.

22. The building structure of claim 21 wherein the sheets are connected to the connector by screws.

10 23. The building structure of claim 21 wherein the structure is part of a ceiling or wall.

24. (new) A butt joint connector for forming a butt joint between two building sheets, each respectively having a 15 butt joint edge, comprising:

a first plurality of attachment members for attachment to one of the sheets;

20 a second plurality of attachment members for attachment to the other of the sheets so that the connector spans the edges of the respective sheets when the connector is attached to the sheets;

25 connecting elements for connecting first attachment members together and for connecting second attachment members together, so that the first and second attachment members can move, from a collapsed position in which the first attachment members are in side-by-side relationship and the second attachment members are in side-by-side relationship, to an expanded position in which the first attachment members are spaced apart from 30 one another and the second attachment members are spaced apart from one another; and

35 wherein the first and second plurality of attachment members define a concavity so that when the first and second sheets are connected to the attachment members, the sheets adjacent the edges are pulled towards the attachment members so as to define a recess adjacent the edges so that the recess can be finished with a filler to fill the recess and form the butt joint.